



# Focus: Stream Temperature in the Salmon Creek Watershed

## Introduction

As Clark County becomes more urbanized, we are faced with the challenge of balancing population growth with protection of our natural resources. Part of the challenge is to provide enough information to resource managers and citizens so that they know where pollution problems occur and where to focus their attention. This focus sheet highlights one aspect of water quality—temperature—with information summarized from the Clark County Water Resources technical report, *Salmon Creek Watershed: Summer 2003 Stream Temperature*.

## Background

The Salmon Creek watershed covers 89 square miles of Clark County. Its land uses are typical of a developing area: rural, residential, commercial, forest and industrial land. With a population of 87,000, the Salmon Creek watershed is the second most populated watershed in the county. Between 1990 and 2004, annual population growth in the watershed was 4.9 percent. Human activities in the Salmon Creek watershed have had numerous impacts on the creek, including increased water temperature.

Why is increased water temperature a problem? If you have ever enjoyed a hot bath, you know that warm water feels good and even benefits health. However, the reason humans can enjoy warm water is that we are warm-blooded, meaning we regulate our temperature internally. Cold-blooded aquatic species, including threatened salmon, cannot regulate internal temperature. Their body temperature is the same as the surrounding air or water temperature. Each species has adapted to a certain temperature range and when temperatures rise or fall beyond this range they may be harmed or even killed.

The county's Clean Water Program studied water temperature in the Salmon Creek watershed to determine the extent to which the creek and its tributaries are suitable for aquatic life. The state agency in charge of setting environmental regulations, Washington Department of Ecology, has set 64°F as the maximum temperature to protect streams with salmon.

## Causes of higher water temperatures

The more a stream is exposed to sunlight, the higher the water temperature will be. Human activities create conditions that increase stream exposure to sunlight. These include:

- **Lack of streamside shade.** Removing or disturbing trees and other vegetation along stream banks allows more sunlight to reach the stream.



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- **Lower stream flows.** Withdrawing surface water for irrigation, ponds, and agriculture reduces the flow in a creek. Creeks with low flows are more quickly influenced by solar heating.
- **Stream channel widening.** Erosion and other changes to the bed and banks of a stream can create a wider and shallower stream that is more vulnerable to solar heating.
- **Ponds.** Slow-moving or still water that is connected to a stream will heat up in the summer and contribute to warmer temperatures as it drains into a creek.



*Salmon Creek at NW 36th Avenue*

### Findings

Temperature sensors recorded temperatures every hour from June through September at eight locations along the main stem of Salmon Creek, and at seven major tributaries: Rock, Morgan, Woodin (Weaver), Curtin, Mill, Tenny, and Cougar creeks.

- Temperatures exceeded the 64°F standard for protecting salmon and sensitive aquatic life at 12 of the 15 study sites on at least 35 days during summer 2003.
- On days with maximum stream temperature over 64°F, stream temperatures remained above 64°F for long periods, an average of nine to 20 hours each day.
- Of the three tributary creeks that stayed below the 64°F standard (Curtin, Cougar, and Tenny creeks), two are not accessible to migrating fish due to natural barriers very near their confluence with Salmon Creek.
- At the seven warmest sites, maximum temperatures exceeded 70°F each day for periods lasting from 1 to 6 weeks.
- The lower reaches of the Salmon Creek mainstem had the warmest temperatures, and the warmest tributaries were Rock, Morgan, and Woodin (Weaver) Creeks.

- Statistical analysis found that stream temperatures increased as pond acres in the area increased. A previous

study identified an estimated 56 acres of ponds in the watershed, and it is likely that ponds are a significant contributor to elevated stream temperatures.

### Conclusions

Results of the study are significant because they indicate that elevated stream temperatures are higher and more widespread than previously determined. Fortunately, Salmon Creek still supports cold-water migratory fish species. However, warm summer temperatures make life more difficult for coho salmon, steelhead, coastal cutthroat trout and other sensitive aquatic life.

Elevated summertime stream temperature in the Salmon Creek watershed should be considered a significant limiting factor for salmon, steelhead, and trout populations. Water temperatures above 64° increase exposure to disease, decrease food supply, and cause a lack of energy for feeding, growth, and reproduction. Temperatures over 70°F can cause a breakdown of vital processes and possibly death.

Decreasing tributary temperatures and increasing summer streamflow will provide the most immediate benefits to Salmon Creek, while increasing tree canopy cover along the creek will provide benefits in the long-term.



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### Recommendations

While repairing water quality in such a large and heavily-populated watershed will take time and considerable effort, there are specific things that citizens, landowners, and agencies can do.

- Plant trees along Salmon Creek and its tributaries.
- Increase summer flows by infiltrating runoff from roofs, roads, and driveways into the ground instead of allowing it to flow directly into the creeks. This runoff will saturate the soil and slowly feed the creeks throughout the summer.
- Maintain streamside vegetation, especially along the tributaries that are already contributing cold water to Salmon creek: Cougar, Tenny, Curtin and Mill creeks.
- Evaluate ponds draining into Salmon Creek of the likely warming effect they have on the creek.
- Educate landowners about water conservation and land management practices that benefit water quality as well as the landowner.

**For more information about water quality in Salmon Creek, or to order a copy of the technical report, contact:**

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**To view the report or download from our website:**

[www.clark.wa.gov/water-resources/monitoring/reportspublic.html](http://www.clark.wa.gov/water-resources/monitoring/reportspublic.html)

**For information about water conservation and land management practices that will protect water quality, please visit these helpful websites:**

[www.clark.wa.gov/water-resources/education/facts.html](http://www.clark.wa.gov/water-resources/education/facts.html)  
[www.conserveh2o.org](http://www.conserveh2o.org)  
<http://clark.wsu.edu/>  
<http://clark.scc.wa.gov/>  
[www.cleanriversandstreams.org](http://www.cleanriversandstreams.org)



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